



Survival Factors

Airbag Safety Study Factual Report

August 4, 2010

Location: Athens, TX
Aircraft Type: Cessna T182T
Accident Date: 2/27/2007
Accident Time: 1506 CDT
Accident Number: DFW07LA078
Registration Number: N14685
Airbag Equipped: Yes

Group Members:

Rob Molloy, NTSB
Leah Yeager, NTSB
Nora Marshall, NTSB
Mitch Garber, NTSB
Jana Price, NTSB
Kris Poland, NTSB
Tom Barth, AmSafe

Summary

On February 27, 2007, approximately 1506 central daylight time, a single-engine Cessna T182T airplane, N14685, was substantially damaged during a forced landing to a field near Athens, Texas, following a loss of engine power. The pilot in the front right seat and the passenger in the rear left seat were seriously injured, and the passenger in the front left seat sustained minor injuries. The airplane was registered to a private corporation and operated by one of the passengers. No flight plan was filed for the cross-country flight that originated at a private airstrip near Berryville, Texas, about 1455, and was destined for the Midland International Airport (MAF), near Midland, Texas.

According to the pilot, the airplane was operating normally until it reached an altitude of 5,000 feet, when the turbine-inlet-temperature warning light illuminated on the multi-function display unit, followed by a sudden loss of engine power. The pilot reduced the engine throttle setting and adjusted the pitch of the airplane to establish the best glide speed and attempted to reach the Athens Municipal Airport, near Athens, Texas. When the pilot realized that he would not be able to reach the Athens Municipal Airport, he elected to execute a forced landing at a grass field southeast of the airport. The pilot stated that the airplane was traveling approximately 50 knots when it touched down in the field. The pilot reported that the left main landing gear dug into the ground and the

airplane nosed-over, coming to rest in an inverted position (see figures 1 and 2). The pilot stated that he unfastened his seatbelt, fell onto the ceiling of the airplane, and slid out onto the wing on his back. The pilot also stated that the front left seat passenger and rear left seat passenger were able to release their seatbelts easily¹ and that they exited the airplane through the left door.



Figure 1: A photograph showing the right side of Cessna T182T, N14685, which crashed in Athens, Texas (DFW07LA078).

¹ However, in a subsequent interview with the left rear seat passenger, the passenger reported that he was unable to unbuckle his restraint after the crash and needed assistance from the left front seat passenger to do so.



Figure 2: A photograph showing the left side of Cessna T182T, N14685, which crashed in Athens, Texas (DFW07LA078).

Airplane Damage

The airplane came to rest inverted in a flat grassy pasture with a magnetic heading of 070 degrees at a field elevation of approximately 461 feet mean sea level. At the initial impact point there was a series of ground scars that were located approximately 120 feet from the resting place of the airplane. The airplane sustained structural damage to the vertical stabilizer and to both wings, with the greatest damage on the right wing. In addition, the left main wheel was separated from the strut, and the nose-wheel assembly had sheared from the airplane.

No deformation was noted on any of the airplane's four seats. There were 3-point restraints at all seating locations. There was no damage observed to the restraint systems, and the inertia reels for all three occupied seatbelt systems were functional after the accident. Load marks² were observed on the webbing of all three occupied restraints. For the front left seat, the distance between the restraint anchor point to the load mark was 38

² Load marks are visible indentations on the restraint fabric beneath the buckle area, and are indicative of restraint usage in a crash.

inches; for the front right seat, the distance between the anchor point and the load mark was 44 inches, and for the rear left seat, the distance between the cushion reference point³ and the load mark was 41 inches.

Airbag System

The airplane had airbags installed in the lap belt portion of the 3-point harnesses in all seating positions, and none of the airbags deployed during the crash. All four seatbelt assemblies, seats, and the two electronic module assemblies (EMAs) used to deploy the front and rear seat airbags were properly installed. On-scene diagnostic testing of the EMAs using the AmSafe System Diagnostic Tool (SDT) did not reveal any anomalies. The EMAs were removed and tested at AmSafe Incorporated, Phoenix, Arizona, on May 16, 2007, under the supervision of the FAA. Both EMA units functioned normally and performed as designed (see addendum).

Occupant Details

A summary of occupant demographics is depicted in Figure 3. The front right seat occupant (pilot) was 5 feet, 8 inches tall, weighed 234 pounds, and was 37 years old. He sustained three compression vertebral fractures near the base of his neck (C-7, T-1, and T-2). He also had a laceration on his head that did not require stitches. The occupant, who also reported that he had previously been employed as a paramedic, believed that his neck injury occurred as a result of his head hitting the ceiling of the airplane during the crash, and he reported that after the crash he was hanging from the seatbelt and that the vertebral fractures affected sensation in his arm.

The front left seat passenger was 5 feet 11 inches tall, weighed 176 pounds, and was 31 years old. The rear left seat passenger was 5 foot 11 inches tall, 241 pounds, and was 58 years old. Based on a questionnaire completed by the pilot, both passengers suffered bruises and sprains, and the rear left seat passenger sustained rib injuries. In a subsequent interview with the rear left seat occupant, he reported that two of his ribs (ribs #4 and #5) had cracked on the right front side of his body. He also reported that his ribs had “pulled out of the soft tissue” near his sternum.

Restraint Usage

In his interview, the pilot noted that at the beginning of the flight, the left front seat passenger had incorrectly attempted to use the restraint for the right seat. In the Cessna T182T, both of the front seat belts hang from the ceiling between the two seats. The pilot, who was also a certified flight instructor, noted that there had been other occasions when his students had inadvertently used the wrong restraint in either the Cessna 172 or Cessna 182. The study team documented the fact that in Cessna-manufactured airplanes, it is possible to cross the belts in such a way that the incorrect airbag system can become activated. For example, if a left-seated occupant fastens the right seat shoulder harness to

³ The cushion reference point is the place where the seat cushion meets the back cushion.

his/her outboard buckle, the airbag system in the unused seatbelt would be active while the airbag in the buckled belt would be inactive.

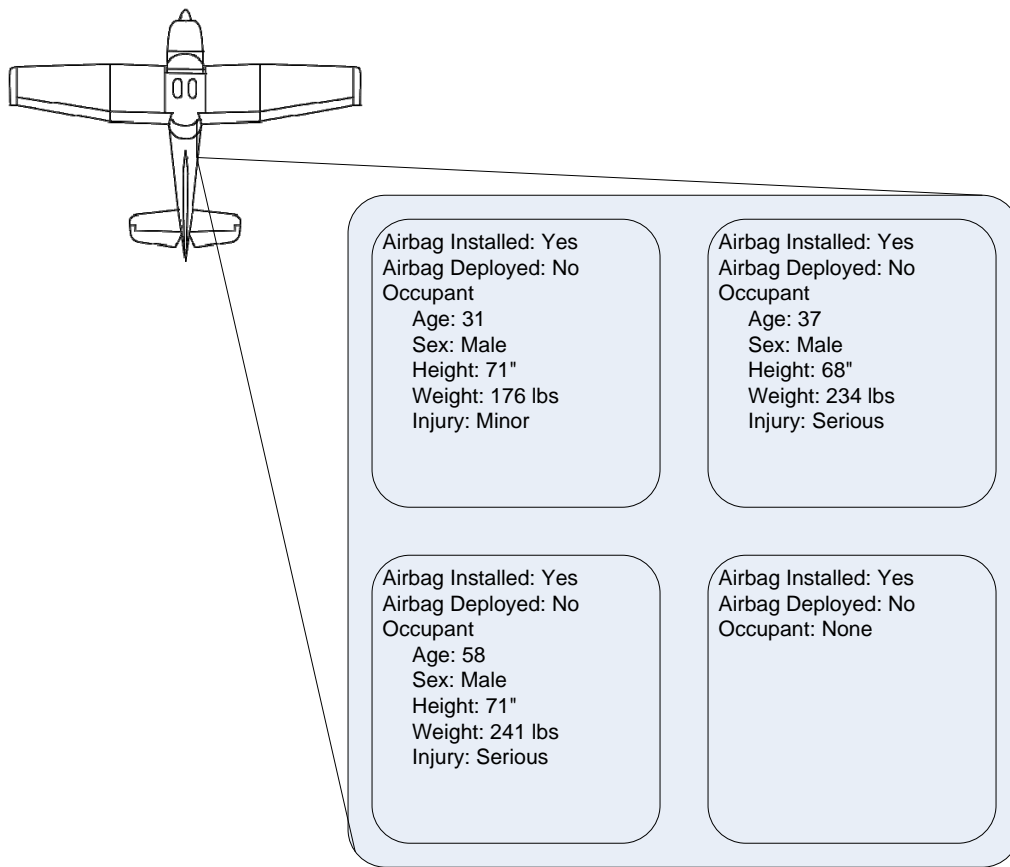


Figure 3: A diagram depicting a summary of seat and occupant information for the Cessna T182T.